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Status of the genetic resources of apple and pear in the Netherlands

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APPLE

Centre for Genetic Resources, the Netherlands (CGN)

CGN maintains the Dutch genebank for plant genetic resources for food and agriculture under a mandate of the Dutch government. CGN holds collections of several agricultural and horticultural crops, collectively comprising about 23,000 accessions. Nearly all accessions are stored as seeds at -20 °C. In addition, CGN maintains an *in vivo* collection of apple.

History of the apple collection

Since January 2002 the current apple collection of CGN forms part of the national programme “Genetic Resources”, financed by the Netherlands Ministry of Agriculture, Nature and Food Quality. The collection currently comprises 151 accessions that are conserved in an experimental orchard of Applied Plant Research, Sector Fruit in the village of Randwijk. The collection mainly consists of old Dutch varieties, supplemented with research material and wild crop relatives. The CGN collection started as a core collection of 83 accessions that were selected in 1986 from 184 varieties based on important agro-morphological characters. These 184 varieties had remained after a detailed study of the passport data of several hundreds of varieties that were distributed over three experimental orchards in the Netherlands and that had mainly been used for studies on pest and disease resistances. The 83 accessions were planted on rootstock M.9 in the experimental orchard of the former Research Station for Fruit Growing in the village of Wilhelminadorp. In 1996, new trees were made by chipbudding on M.9, and in 1999 all trees reached their current location in Randwijk. Since then the collection was gradually extended with new accessions, mainly material with important disease resistances, local Dutch genotypes and wild crop relatives. Each accession is represented by five trees. The collection is curated by Henk Kemp, who on behalf of CGN will distribute materials at the request of bonafide users.

Utilization and research

Accessions have been included in several studies in order to support conservation and use. During the period 1976-1982, research was carried out on scab, mildew, fruit tree canker, red spider mite (*Panonychus ulmi*), predatory mites (e.g. *Typhlodromus pyri*), mottled umber moth (*Erannis defoliaria*), winter moth (*Operophtera brumata*), *Orthosia* sp. and tortrix moth (*Archips* sp.). Investigations were also performed on codling moth (*Cydia pomonella*), common green capsid (*Lygocoris pabulinus*), apple blossom weevil (*Anthonomus pomorum*), apple sawfly (*Hoplocampa testudinea*), apple-grass aphid (*Rhopalosiphum insertum*), rosy apple aphid (*Dysaphis plantaginea*), green apple aphid (*Aphis pomi*), woolly aphid (*Eriosoma lanigerum*), and apple pygmy moth (*Stigmella malella*). In addition, production, flowering phenology, picking period, and spring frost susceptibility were recorded. More recent studies included susceptibility to fruit tree canker (*Nectria galligena*) and to the apple-grass aphid (*Rhopalosiphum insertum*). At the former location of Wilhelminadorp, where no fungicides were applied during the period 1995-1999, several observations were carried out on scab (leaf and fruit), mildew and fruit tree canker, as well as on vigour and tree habit. In 1998, the taste of the fruits was examined and the varieties were pomologically described. After a severe attack in the winter of 2001 and 2002, fruit tree canker was examined at the location of Randwijk. Studies on aphids are planned for the forthcoming years. In 2005, the entire collection was characterized with microsatellites. Distribution of collection material included the transfer of seeds to New Zealand in order to broaden the genetic diversity used in apple breeding programmes in that country.

Documentation

The databases of CGN can be searched online and available data may be downloaded. Passport data of apple include genus, species, subcrop (wild, sour, sweet, ornamental), accession name, country of origin, collection site, sample status (wild, landrace, cultivar), collecting source (wild, farm, research), donor details, origin address, ancestry data and additional relevant remarks. Characterization and evaluation data have been summarized in reports that soon will become available on CGN's website (<http://www.cgn.wur.nl/UK>).

Other apple collections in the Netherlands

Parallel to CGN, several NGOs in the Netherlands are actively involved in the conservation of genetic resources of apple. These NGOs are located in different parts of the Netherlands and focus predominantly on old (regional) Dutch varieties, although the collections may also include foreign varieties and wild material. An estimated number of 2000 varieties are collectively conserved in Dutch apple collections. Probably, only half of these varieties are genetically different because of a high estimated level of redundancy both within and between the collections. Lots of valuable knowledge about apple varieties exists within the NGOs. Unfortunately, the introduction of an adequate tagging system for trees, the careful identification of varieties and the proper documentation of the accessions is severely hampered by limited funds. Cooperation between CGN and Dutch NGOs was initiated in 2005 with the molecular characterization of about 700 apple trees. Currently, cooperation focuses on the development of a common database.

PEAR

CGN does not maintain a genetic resources collection of pear. Old (Dutch) varieties of pear are conserved by the same NGOs that are also involved in the conservation of apple. The number of different varieties collectively maintained by Dutch NGOs can be roughly estimated on 200-400. Concerning the conservation of pear, NGOs face the same problems as in the case of apple.